

ATC

Document 134
October 2018

Technical Committee of Petroleum Additive Manufacturers in Europe AISBL
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Carbon Dioxide (CO₂) Reduction and Fuel Economy Benefits of Lubricants

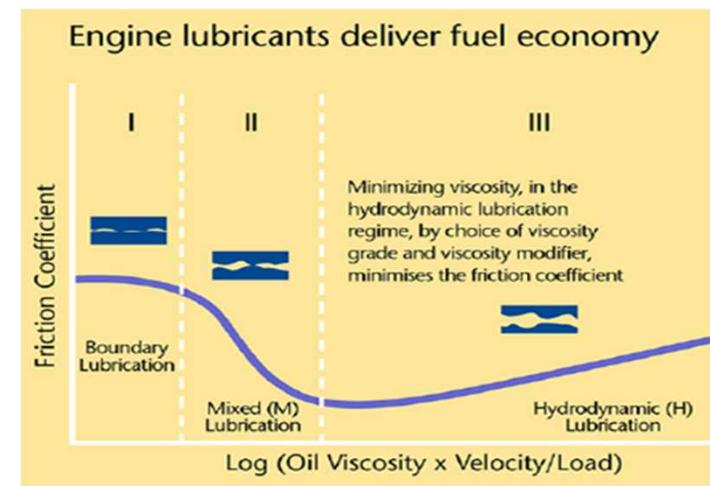
October 2018

CO₂ Reduction and Fuel Economy Benefits of Lubricants

- A significant focus for vehicle systems design and lubrication is to enhance fuel economy
 - to conserve resources and reduce vehicle contributions to emissions
- European and US lubricant testing puts significant emphasis on fuel economy performance
- Reducing energy loss due to friction in the engine is key to improving the fuel economy performance of vehicles
- Driving lubricants trends towards
 - lower viscosity oils
 - innovative new additive technology
- Additives with viscosity or friction modifying properties can aid fuel economy

FE requirement in industry and OEM tests	
Specification	FE requirement
ACEA A1/B1, A5/B5, C2	2.5%
ACEA C3, C5	1.0%, 3.0%
BMW	1.0%
Daimler	1.0 or 1.7%
Ford	2.5, 3.0 or 3.3%
JLR	3.0, 3.3 or 3.8%
GM Opel	1.5%
Renault	1.0% or 2.5%
PSA	1.0, 2.5, 3.0 %
VW	2.0%

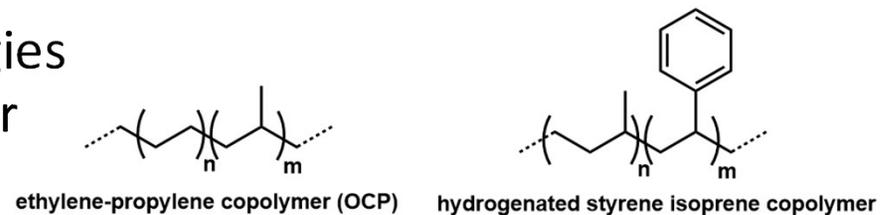
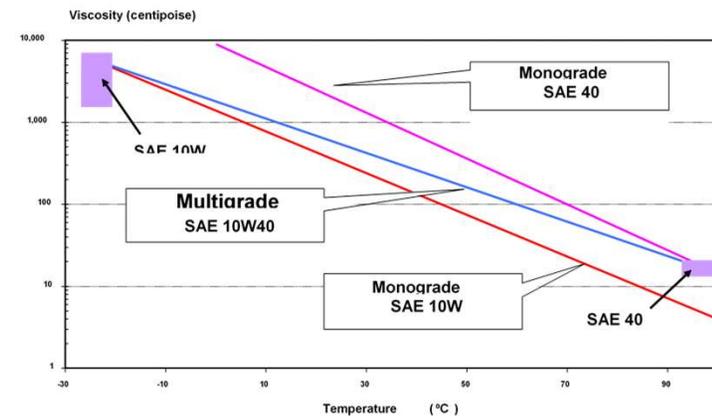
FE requirements, industry and OEM specifications as measured in M111FE



Stribeck curve showing different lubrication regimes

Viscosity Modifiers for Improved Fuel Economy (FEI)

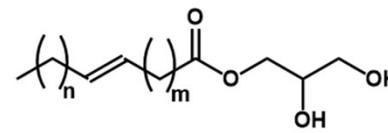
- Viscosity modifiers are used to minimise the impact of temperature on viscosity
 - Reducing energy losses at lower operating temperature
 - Whilst maintaining durability
- Trend towards lower viscosity engine oils is driven by the need to deliver improved fuel economy
- New viscosity modifier technologies are being deployed in these lower viscosity engine oils
 - Molecules contract at lower temperatures to reduce viscous drag



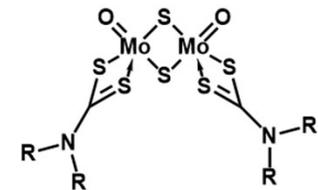
Examples of Viscosity Modifiers

Friction Modifiers for Improved Fuel Economy (FEI)

- Boundary lubrication occurs in various stressed parts of the engine
- Friction modifiers are used to reduce energy losses in boundary regimes
- These compounds react on the metal surface to form structures that allow sliding and shearing to take place
 - Reducing power losses due to friction



glycerol monooleate (GMO)



molybdenum dithiocarbamate (MoDTC)

Example of Friction Modifiers

- [Lubricant Additives Use and Benefits](#) describes in detail the chemistries and mode of action of FEI technologies



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